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Title: Speech Reference Enrollment	) date:
Method	)
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TC/AU: 2626	)
	)
Examiner: Donald Storm	)
	) _/Michael W. Zimmerman/_
Docket No.: 20103/A00386-2	)
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	) Reg. No. 57,993

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO THE OFFICE ACTION DATED APRIL 20, 2006

Dear Sir:

Please enter the following amendments and consider the following remarks.

Changes to the Specification begin on page 2 of this paper.

The Status of the Claims is reflected in the listing of claims that begins on page 3 of this paper.

Remarks begin on page 15 of this paper.

Changes to the Specification

Please change the title of the application to be:

Method and Apparatus to Perform Speech Reference Enrollment

Please replace the abstract with the following amended abstract.

A speech reference enrollment method involves ~~the following steps: (a)~~ requesting a user speak ~~a vocabulary word; (b)~~ a word; detecting a first ~~utterance (354); (c)~~ utterance; requesting the user speak ~~the vocabulary word; (d)~~ the word; detecting a second ~~utterance (358); (e)~~ utterance; determining a first similarity between the first utterance and the second ~~utterance (362); (f)~~ utterance; when the first similarity is less than a predetermined similarity, requesting the user speak the ~~vocabulary word; (g)~~ word; detecting a third ~~utterance (366); (h)~~ utterance; determining a second similarity between the first utterance and the third ~~utterance (370); and (i)~~ utterance; and when the second similarity is greater than or equal to the predetermined similarity, creating a reference ~~(364)~~.

Please replace paragraph [0001] with the following amended paragraph:

[0001] This application is a continuation of application no. 09/436,296, filed November 8, 1999, now Patent No. 6,249,760, which is a continuation in part of the patent application having Ser. No. 08/863,462, filed May 27, 1997~~, entitled "Method of Accessing a Dial-up Service" and all applications are assigned to the same assignee as the present application~~.

This listing of claims will replace all prior versions, and listings, of claims in the application:

The Status of the Claims

1. (Currently Amended) A speech reference enrollment method, comprising ~~the steps of~~:

(a) receiving a first utterance of a ~~vocabulary~~ word;

(b) extracting a plurality of features from the first utterance;

(c) receiving a second utterance of the ~~vocabulary~~ word;

(d) extracting the plurality of features from the second utterance;

(e) determining a first similarity between the plurality of features from the first utterance and the plurality of features from the second utterance;

(f) when the first similarity is less than a predetermined similarity, requesting a user to speak a third utterance of the ~~vocabulary~~ word;

(g) extracting the plurality of features from the third utterance;

(h) determining a second similarity between the plurality of features from the first utterance and the plurality of features from the third utterance; and

(i) when the second similarity is greater than or equal to the predetermined similarity, forming a reference for the ~~vocabulary~~ word.

2.   (Currently Amended) The method of claim 1, further ~~including the steps of:~~comprising:

(j) when the second similarity is less than the predetermined similarity, determining a third similarity between the plurality of features from the second utterance and the plurality of features from the third utterance; and

(k) when the third similarity is greater than or equal to the predetermined similarity, forming the reference for the ~~vocabulary~~ word.

3.   (Currently Amended) The method of claim 2, further ~~including the steps of~~comprising:

(l) when the third similarity is less than the predetermined similarity, ~~returning to step (a)~~receiving another first utterance of the word.

4.   (Currently Amended) The method of claim 1, ~~wherein step (e) further includes the steps of~~ further comprising:

~~(e1)~~ determining a duration of the second utterance; and

~~(e2)~~ when the duration is less than a minimum duration, disregarding the second utterance.

5.   (Currently Amended) The method of claim 1, ~~wherein step (e) further includes the steps of~~ further comprising:

~~(e1)~~ determining a duration of the second utterance; and

~~(e2)~~ when the duration is greater than a maximum duration, disregarding the second utterance.

6.　　(Currently Amended) The method of claim 5, ~~wherein step (c1) further includes the steps of~~ further comprising:

(i) setting an amplitude threshold;

(ii) determining a start time when an input signal exceeds the amplitude threshold;

(iii) determining an end time, after the start time, when the input signal is less than the amplitude threshold; and

(iv) calculating the duration as a difference between the end time and the start time.

7.　　(Currently Amended) The method of claim 1, ~~wherein step (d) further includes the steps of~~ further comprising:

(d1) determining an estimate of a number of voiced speech frames; and

(d2) when the estimate of the number of voiced speech frames is less than a threshold requesting the user repeat the ~~vocabulary word;~~word.

~~(d3) returning to step (c);~~

8.　　(Currently Amended) The method of claim 1, ~~wherein step (a) further includes the steps of~~ further comprising:

(a1) determining a signal to noise ratio of the first utterance; and

(a2) when the signal to noise ratio is less than a predetermined signal to noise ratio, increasing a gain of a voice amplifier.

9.   (Currently Amended) The method of claim 8, further ~~including the step of:~~comprising

(a3) requesting the user repeat the ~~vocabulary~~ word.

10.   (Currently Amended) The method of claim 1, ~~wherein step (b) further includes the step of~~ further comprising:

(b1) determining an amplitude histogram of the first utterance.

11.   (Currently Amended) A speech reference enrollment method, ~~comprising the steps of:~~comprises:

(a) requesting a user speak a ~~vocabulary~~ word;

(b) detecting a first utterance;

(c) requesting the user speak the ~~vocabulary~~ word;

(d) detecting a second utterance;

(e) determining a first similarity between the first utterance and the second utterance;

(f) when the first similarity is less than a predetermined similarity, requesting the user speak the ~~vocabulary~~ word;

(g) detecting a third utterance;

(h) determining a second similarity between the first utterance and the third utterance; and

(i) when the second similarity is greater than or equal to the predetermined similarity, creating a reference.

12.   (Currently Amended) The method of claim 11, further ~~including the steps of:~~comprising:

~~(j)~~ determining a third similarity between the second utterance and the third utterance; and

~~(k)~~ when the third similarity is greater than or equal to the predetermined similarity, creating the reference.

13.   (Currently Amended) The method of claim 12, further ~~including the steps of:~~comprising:

~~(l)~~ when the third similarity is less than the predetermined similarity, ~~returning to step (a)~~requesting the user re-speak the word.

14.   (Currently Amended) The method of claim 11, ~~wherein step (b) further includes the steps of:~~ further comprising:

~~(b1)~~ determining if the first utterance exceeds an amplitude threshold within a timeout period; and

~~(b2)~~ when the first utterance does not exceed the amplitude threshold within the timeout period, ~~returning to step (a)~~requesting the user re-speak the word.

15.   (Currently Amended) The method of claim 11, ~~wherein step (b) further includes the steps of~~: further comprising:

(~~b1~~) determining an estimate of a number of voiced speech frames; <u>and</u>

(~~b2~~) when the number of voiced speech frames is less than a predetermined number of voiced speech frames, ~~returning to step (a).~~<u>requesting the user re-speak the word.</u>

16.   (Currently Amended) The method of claim 11, ~~wherein step (b) further includes the steps of~~: further comprising:

(~~b1~~) determining a duration of the first utterance;

(~~b2~~) when the duration is less than a minimum duration, ~~returning to step (a):~~<u>requesting the user re-speak the word; and</u>

(~~b3~~) when the duration is greater than a maximum duration, ~~returning to step (a).~~<u>requesting the user re-speak the word.</u>

17.   (Currently Amended) A computer readable storage medium containing computer readable instructions ~~that~~that, when executed by a ~~computer performs the following steps:~~computer, cause the computer to:

(a)~~requesting~~request a user speak a ~~vocabulary~~word;

(b)~~receiving~~receive a first digitized utterance;

(c)~~extracting~~extract a plurality of features from the first digitized utterance;

(d)~~requesting~~request the user speak the ~~vocabulary~~word;

(e)~~receiving~~receive a second digitized utterance of the ~~vocabulary~~word;

(f)~~extracting~~extract the plurality of features from the second digitized utterance;

(g)~~determining~~determine a first similarity between the plurality of features from the first digitized utterance and the plurality of features from the second digitized utterance;

~~(h)~~ when the first similarity is less than a predetermined similarity, ~~requesting~~request the user to speak a third utterance of the ~~vocabulary~~word;

(i) ~~extracting~~extract the plurality of features from a third digitized utterance;

(j)~~determining~~determine a second similarity between the plurality of features from the first digitized utterance and the plurality of features from the third digitized utterance; and

~~(k)~~when the second similarity is greater than or equal to the predetermined similarity, ~~forming~~form a reference for the ~~vocabulary~~word.

18.   (Currently Amended) The computer readable storage medium of claim 17~~,~~ ~~further executing the steps of:~~containing computer readable instructions that, when executed by the computer, cause the computer to:

~~(l)~~ when the second similarity is less than the predetermined similarity, ~~determining~~determine a third similarity between the plurality of features from the second digitized utterance and the plurality of features from the third digitized utterance; and

~~(m)~~ when the third similarity is greater than or equal to the predetermined similarity, ~~forming~~form the reference for the ~~vocabulary~~ word.

19.   (Currently Amended) The computer readable storage medium of claim 18~~,~~ ~~further executing the steps of~~containing computer readable instructions that, when executed by the computer, cause the computer to:

~~(n)~~ when the third similarity is less than the predetermined similarity, ~~returning to step (a).~~requesting the user re-speak the word.

20.   (Currently Amended) The computer readable storage medium of claim 17, ~~wherein step (c) further includes the steps of:~~ containing computer readable instructions that, when executed by the computer, cause the computer to:

~~(c1)~~ ~~determining~~determine a signal to noise ratio; and

~~(c2)~~ when the signal to noise ratio is less than a predetermined signal to noise ratio, ~~going to step (a);~~request the user re-speak the word.

~~(c3) determining if an amplifier gain is saturated;~~

~~(c4) when the amplifier gain is saturated, going to step (a).~~

21.   (Currently Amended) The computer readable storage medium of claim 20, ~~wherein step (c2) further includes the step of increasing a gain of an amplifier.~~containing computer readable instructions that, when executed by the computer, cause the computer to increase a gain of an amplifier when the signal to noise ratio is less that the predetermined signal to noise ratio.

22.   (Currently Amended) The computer readable storage medium of claim ~~20,~~ 17, ~~wherein step (c4) further includes the step of decreasing a gain of an amplifier.~~ containing computer readable instructions that, when executed by the computer, cause the computer to:
       determine if an amplifier gain is saturated; and
       when the amplifier gain is saturated, request the user re-speak the word.

23.   (Currently Amended) A speech reference enrollment method, comprising ~~the steps of~~:
       ~~(a)~~ receiving a first utterance of a ~~vocabulary~~ word;
       ~~(b)~~ extracting a plurality of features from the first utterance;
       ~~(c)~~ determining a signal to noise ratio of the first utterance;
       ~~(d)~~ when the signal to noise ratio is less than a predetermined signal to noise ratio, increasing a gain of a voice amplifier;
       ~~(e)~~ receiving a second utterance of the ~~vocabulary~~ word; and
       ~~(f)~~ extracting the plurality of features from the second utterance.

24.   (Currently Amended) The method of claim 23, further ~~including the steps of~~ comprising:

(g) determining a first similarity between the plurality of features from the first utterance and the plurality of features from the second utterance;

(h) when the first similarity is less than a predetermined similarity, requesting a user to speak a third utterance of the ~~vocabulary~~ word;

(i) extracting the plurality of features from the third utterance;

(j) determining a second similarity between the plurality of features from the first utterance and the plurality of features from the third utterance; and

(k) when the second similarity is greater than or equal to the predetermined similarity, forming a reference for the ~~vocabulary~~ word.

25.   (Currently Amended) The method of claim 24, further ~~including the steps of~~ comprising:

(l) when the second similarity is less than the predetermined similarity, determining a third similarity between the plurality of features from the second utterance and the plurality of features from the third utterance; and

(m) when the third similarity is greater than or equal to the predetermined similarity, forming the reference for the ~~vocabulary~~ word.

26.   (Currently Amended) The method of claim 23, ~~wherein step (f) further includes the steps of~~: further comprising:

(f1) determining a signal to noise ratio of the first utterance; and

(f2) when the signal to noise ratio is less than a predetermined signal to noise ratio, increasing a gain of a voice amplifier and ~~proceeding to step (e)~~:receiving a third utterance of the word.

27.   (Currently Amended) A speech recognition~~, verification and enrollment~~ system, comprising:

an adjustable gain amplifier connected to an input speech signal;

an amplitude comparator ~~having a first input connected to the~~ to compare an output of the adjustable gain amplifier ~~and a second input connected~~ to a saturation threshold; and

a feature comparator ~~is~~ connected to ~~the~~ an output of ~~the~~ a feature extractor, where ~~the~~ a gain input of the adjustable gain amplifier can be adjusted both up and down during ~~the speech input~~ receipt of the input speech signal.

28. (Currently Amended) The system of claim 27, further ~~including,~~comprising

a feature extractor is connected to ~~the~~ an output of the adjustable gain ~~amplifier;~~ amplifier, wherein the feature extractor forms an amplitude histogram.

29. (Currently Amended) The system of claim 27, further ~~including,~~comprising

a signal to noise comparator having a first input connected to ~~the~~ a signal to noise

meter and a second input connected to a threshold, an output of the signal to noise

comparator is connected to a gain input of the adjustable gain amplifier.

30. (Currently Amended) The system of claim 27, further ~~including~~ comprising an

amplitude threshold detector connected to the input speech signal.

31. (Original) The system of claim 30, further including a timer connected to an

output of the amplitude threshold detector.

32. (Original) The system of claim 30, wherein the feature extractor forms an

amplitude histogram.

Remarks

The applicant has carefully considered the official action dated April 20, 2006, and the references it cites. In the official action, claims 1-3, 5-13, 15-24, and 26-29 were rejected and claims 4, 14, 25, and 30-32 were objected to as being dependent on a rejected base claim but indicated as allowable if rewritten in independent form to include all of the elements of the base claim and any intervening claims. By way of this response, the applicant has amended the title of the application. In addition, the applicant has amended the abstract and paragraph [0001] of the application. Also, the applicant has amended claims 1-30 to clarify the scope of protection sought. No new matter has been added. The applicant respectfully traverses the rejections and believes the pending claims are allowable over the cited art. In view of the following, the applicant respectfully submits that all pending claims are in condition for allowance and respectfully requests favorable reconsideration.

I.   Claim Informalities

In the official action, claims 4, 14, 25, and 30-32 were objected to as depending from a rejected base claim. In the discussion below concerning the prior art rejections, the applicant respectfully traverses the rejections of the base claims from which the objected to claims depend. Accordingly, the applicant respectfully submits that each of the claims 4, 14, 25, and 30-32 depends from an allowable base claim and requests withdrawal of the objections thereof.

In the official action, claims 7, 26, and 28 were objected to under 37 C.F.R. § 1.75(a) because the claims did not end with a period. The applicant respectfully submits that the amendments made to claims 7, 26, and 28 overcome the § 1.75(a) objections thereof. Accordingly, the applicant respectfully requests withdrawal of the § 1.75(a) objections over claims 7, 26, and 28.

In the official action, claims 13 and 19 were objected to under 37 C.F.R. § 1.75(a) for reciting the plural term "steps." The applicant respectfully submits that the amendments made to claims 13 and 19 overcome the § 1.75(a) objections thereof. Accordingly, the applicant respectfully requests withdrawal of the § 1.75(a) objections over claims 13 and 19.

In the official action, claim 27-29, and by dependency claims 28-32, were objected to under 37 C.F.R. 1.75(a) as requiring clarification of antecedent language. The applicant respectfully submits that the amendments made to claims 27-29 overcome the § 1.75(a) objections thereof. Accordingly, the applicant respectfully requests withdrawal of the § 1.75(a) objections over claims 27-32.

In addition, the applicant has amended claims 1-22 to remove the 'step' and 'step of' language to clarify that none of the claims should be interpreted under 35 U.S.C. § 112, paragraph 6.

II. The Statutory Double Patenting Rejections

In the official action, claims 20 and 22 were rejected under 35 U.S.C. § 101 on the ground of statutory double patenting as claiming the same invention as that of claims 18 and 20, respectively, of U.S. Patent No. 6,012,027. The applicant respectfully submits that the amendments to claims 20 and 22 overcome the statutory double patenting rejections. Accordingly, the applicant respectfully requests withdrawal of the statutory double patenting rejections.

III. The Non-Statutory Obviousness-Type Double Patenting Rejections

In the official action, claims 1-3, 5-13, 15-19, 21, 23, 24, and 26 were rejected on the ground of non-statutory obviousness-type double patenting as unpatentable over claims 7-8 of U.S. Patent No. 6,012,027. In addition, claims 27-29 were rejected on the ground of non-statutory obviousness-type double patenting as unpatentable over claim 2 of U.S. Patent No.

6,249,760. The applicant respectfully requests that the requirement to file a terminal disclaimer to overcome the non-statutory obviousness-type double patenting rejection be deferred until all other rejections have been withdrawn.

IV.   The § 103(a) Rejections under Vysotsky and Sakoe et al.

In the official action, claims 1-3, 11-13, and 17-19 were rejected under 35 U.S.C. § 103(a) as unpatentable over Vysotsky in view of Sakoe et al. The applicant respectfully traverses.

a. Independent claim 1 and claims dependent thereon

The applicant respectfully submits that independent claim 1 is allowable over the applied art. Independent claim 1 is directed to a method and recites, *inter alia*, when a first similarity is less than a predetermined similarity, requesting a user to speak a third utterance of a word. The examiner concedes that Vysotsky does not teach "when a first similarity is less than a predetermined similarity, requesting a user to speak a third utterance of a word." *See Office Action of April 20, 2006*, p. 7, ll. 9 and 10. The applicant agrees. Instead, Vysotsky teaches prompting a user to repeat a voice message when a recognition score of a token is <u>not less than</u> a preset (predetermined) value. *See Vysotsky*, col. 9, ll. 21-30 and col. 7, ll. 41-45. However, the examiner looks to Sakoe et al. to overcome the deficiency of Vysotsky. Sakoe et al. teach a pattern recognition system that calculates similarity measures (quantities representative of similarities) between reference patterns and patterns to be recognized. *See Sakoe et al.*, col. 2, ll. 16-20. Sakoe et al. also teach that quantities representative of similarities (similarity measures) can be configured to increase with increases in similarity or can be configured to decrease with increases in similarity. *See Id.*, col. 2, ll. 55-64.

The examiner incorrectly alleges that one of ordinary skill in the art would have been motivated at the time of the invention to modify the teachings of Vysotsky in view of the teachings of Sakoe et al. to cause Vysotsky to prompt a user to repeat a voice message when a recognition of a token is less than a preset value (instead of not less than a preset value), thus, rendering independent claim 1 *prima facie* obvious. On the contrary, the applicant respectfully submits that one of ordinary skill in the art would not have been motivated at the time of the invention to combine the teachings of Vysotsky and Sakoe et al. *See MPEP §* *2143.01* ("Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some *teaching, suggestion, or* *motivation* to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art.") (emphasis added).

The examiner suggests that one of ordinary skill in the art would have been motivated to make the combination to change the Vysotsky teachings to generate recognition scores for which higher values indicate greater similarity to provide "a more convenient way of using, visualizing, and teaching comparisons to thresholds that test similarity." *See Office Action of* *April 20, 2006*, p. 8, ll. 1 and 2. The applicant respectfully disagrees. The applicant respectfully submits that the record contains no evidence whatsoever supporting the contention that higher values corresponding to greater similarity as taught by Sakoe et al. provide a more convenient way than Vysotsky of using, visualizing, and teaching comparisons to thresholds that test similarity. On the contrary, Vysotsky clearly teaches that a smaller recognition score corresponds to a better match. *See Vysotsky*, col. 6, ll. 49-52 and col. 7, ll. 21-23. Therefore, Vysotsky teaches a convenient way of using, visualizing, and teaching comparisons to thresholds that test similarity based on smaller recognition scores that indicate better matches. Accordingly, the record lacks the requisite evidence to show

that Sakoe et al. teach a more convenient way than Vysotsky of using, visualizing, and

teaching comparisons to thresholds that test similarity, much less any evidence needed to

show that one of ordinary skill in the art would have been motivated to make the combination

suggested by the examiner. *See In re Lee*, 277 F.3d 1338, 1342-44 (Fed. Cir. 2002)

(discussing the importance of relying on objective evidence and making specific factual

findings with respect to the motivation to combine references and explaining, "This factual

question of motivation is material to patentability, and could not be resolved on *subjective*

belief and unknown authority.") (emphasis added). Accordingly, because the applied art

cannot render independent claim 1 *prima facie* obvious, the applicant respectfully submits

that claim 1 and all claims dependent thereon are allowable over the applied art.

b. Independent claims 11 and 17 and claims dependent thereon

The applicant respectfully submits that independent claims 11 and 17 are allowable

over the applied art at least for the reasons discussed above in connection with independent

claim 1. Accordingly, the applicant submits that independent claims 11 and 17 and claims

dependent thereon are allowable over the applied art.

V.   The § 103(a) Rejections under Boutaud et al.

In the official action, claims 27 and 28 were rejected under 35 U.S.C. § 103(a) as

unpatentable over Boutaud et al. in view of general knowledge in the art. The applicant

respectfully traverses.

The applicant respectfully submits that independent claim 27 is allowable over the

applied art. Independent claim 27 is directed to a speech recognition, verification and

enrollment system that includes, *inter alia*, an adjustable gain amplifier connected to an input

speech signal. The applicant submits that Boutad et al. do not teach an adjustable gain

amplifier connected to an input speech signal, and thus, Boutaud et al. do not teach each and every element recited in claim 27. *See MPEP § 2143.03* ("To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.").

The examiner suggests that an arithmetic logic unit (ALU) (21), an accumulator (23), and an accumulator buffer (31) taught by Boutad et al. constitute an adjustable gain amplifier connected to an input speech signal. The applicant respectfully disagrees. On the contrary, Boutaud et al. describe that the ALU (21), the accumulator (23), and the accumulator buffer (31) as being configured to computer maximums and minimums and that such computations can be used to control an automatic gain amplifier. *See Boutaud et al.*, col. 45, ll. 50-55. That is, the ALU (21), the accumulator (23), and the accumulator buffer (31) are separate from an automatic gain amplifier. Therefore, the ALU (21), the accumulator (23), and the accumulator buffer (31) cannot be fairly construed to constitute the adjustable gain amplifier recited in claim 27. Further, an adjustable gain amplifier does not inherently exist in the Boutaud et al. system. Specifically, Boutaud et al. describe that the ALU (21), the accumulator (23), and the accumulator buffer (31) can be advantageously used in control systems that use proportional integral and differential (PID) algorithms, in pattern recognition systems, and in image recognition systems. Accordingly, the Boutaud et al. system does not necessarily have an adjustable gain amplifier.

For the above reasons, the applicant submits that Boutaud et al. do not teach each and every element recited in claim 27, and thus, do not render claim 27 *prima facie* obvious. Accordingly, independent claim 27 and all claims dependent thereon are allowable over the applied art.

Conclusion

Reconsideration of the application and allowance thereof are respectfully requested.

If there is any matter that the examiner would like to discuss, the examiner is invited to

contact the undersigned representative at the telephone number set forth below.

Respectfully submitted,

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Dated: **October 20, 2006**   /Michael W. Zimmerman/

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